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**TITLE:** INFLUENCE OF CONTINUOUS EPIDURAL BUPIVACAINE ON PERIOPERATIVE FLUID SHIFTS

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Bupivacaine is frequently employed for postoperative epidural analgesia. Analgesic concentrations of bupivacaine within the epidural space may block the sympathetic nervous system and induce alterations of "Starling's forces". The influence of these changes on perioperative fluid compartment shifts has not been examined. The present study was designed to assess the impact of continuous epidural bupivacaine (0.125%) on the postoperative changes in the intravascular and extracellular fluid compartments following a splenectomy in an instrumented swine model.

Twelve immature swine (20-38kg) underwent halothane anesthesia for placement of carotid artery, pulmonary artery, and T14 epidural catheters, and splenectomy. Following baseline hemodynamic measurements, each animal was randomly assigned to receive 7ml of an unknown solution (either 0.25% bupivacaine followed by a continuous infusion of 0.125% bupivacaine, or saline) through the epidural catheter. Hemodynamic measurements (blood pressure, heart rate, cardiac output, pulmonary capillary wedge pressure...) and serial measurements of plasma protein concentrations and hematocrits were taken at 0,1,6,12,18, and 24 hours. At 24 hours, the plasma volume and extracellular fluid (ECF) volume were estimated by indicator dilution methods.

Animals treated with the epidural bupivacaine infusion were notably more active during the early postoperative period. During the latter phase of the infusion period, all animals in the bupivacaine group demonstrated significant motor blockade affecting their hind limbs. There were no differences between the groups with respect to hemodynamic indices. Plasma volumes for the bupivacaine group were  $56 \pm 6$  vs.  $53 \pm 12$  ml/kg (ns) in the saline group. The ECF space measurements suggest a relative increase in the bupivacaine treated group,  $290 \pm 10$  vs.  $264 \pm 20$  ml/kg ( $p < 0.02$ ). There were no significant differences in total fluid administration or urine output between groups.

Postoperative epidural analgesia with a dilute bupivacaine solution may contribute to expansion of the ECF compartment; however, this expansion of the ECF space does not appear to contribute to an increase in total body fluid. The marginal expansion of the ECF space may represent translocation of intracellular fluid into the extracellular compartment.

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**TITLE:** KETOROLAC VERSUS FENTANYL ANALGESIA FOR OUTPATIENTS UNDERGOING OPERATIONS WITH LOCAL ANESTHESIA

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Ketorolac trometamol is a parenteral nonsteroidal anti-inflammatory drug with strong analgesic properties. The quality of analgesia, side-effects, and speed of recovery after intravenous ketorolac versus intravenous fentanyl were compared in outpatients undergoing operations with local anesthesia.

After Institutional Review Board approval, 44 consenting ASA I or II patients aged  $47 \pm 13$  years scheduled for breast biopsies, lumpectomies, or central line placements were randomly assigned in a double-blinded fashion to receive intraoperative ketorolac, 1.0 mg/kg IV to 60 mg, or fentanyl, 5  $\mu$ g/kg IV to 250  $\mu$ g. All operations were done under local anesthesia. Preoperatively, patients were asked to complete a p-deletion and digit substitution test and rate the intensity of their pain with a linear visual analog scale (VAS). Heart rate, blood pressure, respiratory rate, and VAS were recorded before and after injection of analgesic, and every 5 min intraoperatively and while in the Post-Anesthetic Care Unit (PACU). Speed of recovery was quantitated by follow-up p-deletion and digit substitution tests on admission to the PACU and at 30 min intervals until discharged. The time until patients were able to sit, stand, walk, tolerate oral fluids, and demonstrate orientation to place and time was recorded. The incidence of nausea, vomiting, pruritus, and 20% variation in heart rate, blood pressure, or respiratory rate were recorded. Intergroup parametric data were statistically compared with Student's t test and a two-way analysis of variance. Intergroup parametric data were compared with chi square.

Twenty-three patients received ketorolac, and 21 patients received fentanyl and were statistically comparable with respect to age and type, and duration of operations. Visual analog scores indicated that the complete pain relief normally unobtainable with local anesthesia alone could be achieved equally well with intravenous ketorolac or an equipotent dose of fentanyl. There were no differences in the incidence of intraoperative side-effects; however, the incidence of postoperative nausea was significantly higher in patients who received fentanyl vs. ketorolac (7/21 vs 0/32,  $p = 0.003$ ). The incidence of vomiting in patients who received fentanyl vs ketorolac was 3/21 vs 0/23 ( $p = 0.06$ ). Restoration of psychomotor function and speed of recovery favored the use of ketorolac, though the difference among groups did not reach statistical significance.

Results of this study indicate that ketorolac is a useful alternative to fentanyl for the treatment of intraoperative pain refractory to administration of local anesthetic alone. A decided advantage of ketorolac over fentanyl is that it can be combined with benzodiazepines that, when given simultaneously with narcotics, may result in respiratory depression. Another advantage of ketorolac administration is zero incidence of nausea and vomiting in the postoperative period.